Experiment No: 2

NAME OF THE EXPERIMENT:- Radiation pattern of Yagi-Uda folded dipole with 3 and 5 element antenna

DATE OF PERFORMANCE:- 06/08/2014

DATE OF SUBMISSION:- 13/08/2014

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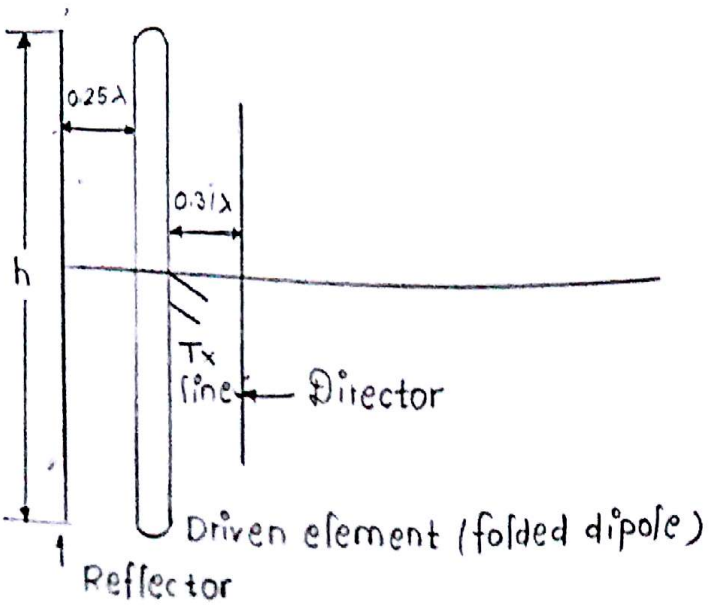
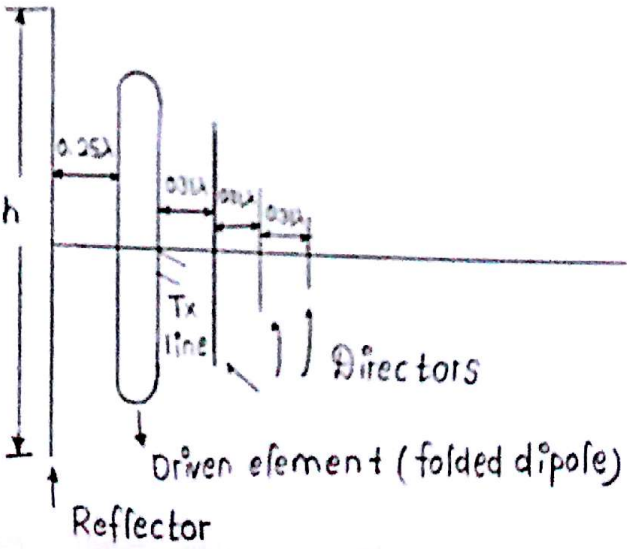
Yagi-Uda 3 element Antenna (folded dipole)



Yagi-Uda 5 element Antenna (folded dipole)



Aim:-

To study the radiation pattern of Yagi-Uda 3 & 5 element antenna (folded dipole) and also find beam width, directivity and front to back ratio.

Apparatus:-

Scientech Antenna kit - ST 2261
Simulation software
Yagi-Uda folded dipole - 3 and 5 element antenna.

Theory:-

Yagi-Uda antenna is a practical radiator in the HF, VHF and UHF ranges. This antenna consists of a number of linear dipole moments one of which is energized directly by a feed transmission line while the others act as paracitic radiators whose currents are induced by mutual coupling. It is designed to operate as an end fire array and it is accomplished by having the parasitic elements in the forward beam act as ~~reflectors~~ directors. It is widely used as a home TV antenna. Typically the driven element is resonan with its length slightly less than $\lambda/2$ (usually 0.45-0.49 λ, whereas the lengths of the directors should be about 0.4 to 0.45 λ. The separation between the directors is typically 0.3-0.4 λ. For director spacing greater than 0.3 λ, the gain is also independent of the radii of the directors upto about 0.024 λ. The length of the reflector is greater than that of the feed. Since the length of each director is smaller than its corresponding resonant length, the impedance of each is capacitive and its current leads the induced e.m.f. Similarly, the

5 ELEMENT SIMPLE DIPOLE						7 ELEMENT SIMPLE DIPOLE					
Angle θ°	(dB)	(μA)	Angle θ°	(dB)	(μA)	Angle θ°	(dB)	(μA)	Angle θ°	(dB)	(μA)
0	33.4	47	190	16.9	6	0	30.4	33	190	10	1
10	33.1	45	200	15.6	5	10	29.8	31	200	0	1
20	32.7	43	210	14.0	3	20	29.5	30	210	0	1
30	30.9	26	220	9.5	2	30	29.2	29	220	0	1
40	28.3	16	230	6	1	40	28.9	28	230	0	1
50	24.1	8	240	0	1	50	28.0	25	240	0	1
60	18.1	3	250	0	1	60	25.1	18	250	0	1
70	9 5	1	260	0	1	70	20	10	260	0	1
80	0	1	270	0	1	80	0	1	270	0	1
90	0	1	280	0	1	90	0	1	280	0	1
100	0	2	290	0	5	100	0	1	290	20	10
110	6.0	2	300	4.0	12	110	0	1	300	25.1	18
120	6.0	4	310	9.5	23	120	0	1	310	28.0	25.
130	12.0	5	320	21.6	30	130	0	1	320	28.9	28
140	14.0	6	330	29.5	37	140	0	1	330	29.2	29
150	15.6	9	340	31.4	43	150	0	1	340	29 5	30
160	19.1	10	350	32.7	47	160	0	1	350	29.8	31
170	20.0	8	360	33.4	49	170	0	1	360	30.4	33
180	13.1	7				180	0	1			

The antenna provides a gain of about 10 dB with a BW of 001 half power 10. By adjusting additiona directions in the beam direction The distance between two elements may range from 0.5λ to 0.3λ. close spacing of elements are used to get good excitation. Therefore, the length of rod is tapered off to achieve the capacitive reactance instead.

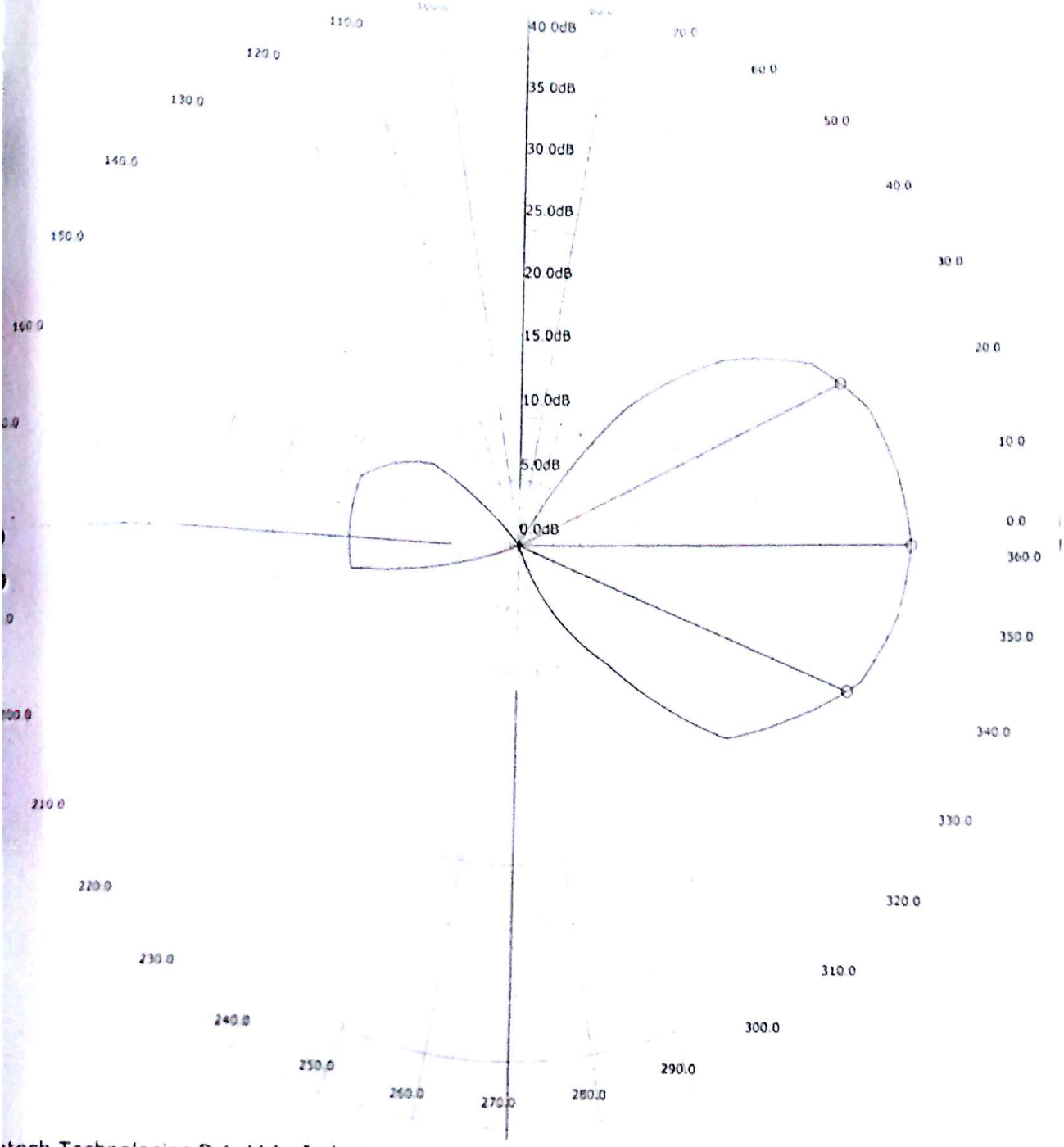
The driven element radiates from front to back port to this radiation indicates current in the parasitic elements. The spacing between driven & parasitic element is decreased then it will load the driven element irrespective of its length. Thus input impedance of the input terminal of driven element reduces. This is why a folded dipole is invariably used as length and spacing approximately. The dimensions can be optimized on increase in gain of ampl' However the dimensions are critical. However is accomplished as a sacrifice is gain of much as 5 dB.

Procedure:-

1) Arrange the setup
2) Mount the simple dipole on transmitter.
3) Bring the director assembly near to main unit and adjust height of be in transmitting and receivers are same.
4) Keep the director assembly away from main unit approximately 1.5 inch and align both of them. Take RF level and fs adjust fomin.

8) Align arrow mark on the disc with zero o
galvanometer scale.
9) Start taking the readings at interval of
10) Convert the μA readings of detectorasse
into dB, then normalize and plot the
11) Plot the polar graph in degrees of rotatio
against level in detector in dB's.
12) Calculate the following with help of cha
i) Beam width
ii) Front/Back ratio
iii) Gain of antenna

Conclusion: We have successfully studied the radiation of Yagi-Uda folded dipole 3 and 5 element and have also found the beam width, direct front to back ratio.



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ment Result :

h : 47, -3dB @ 338, 25 deg

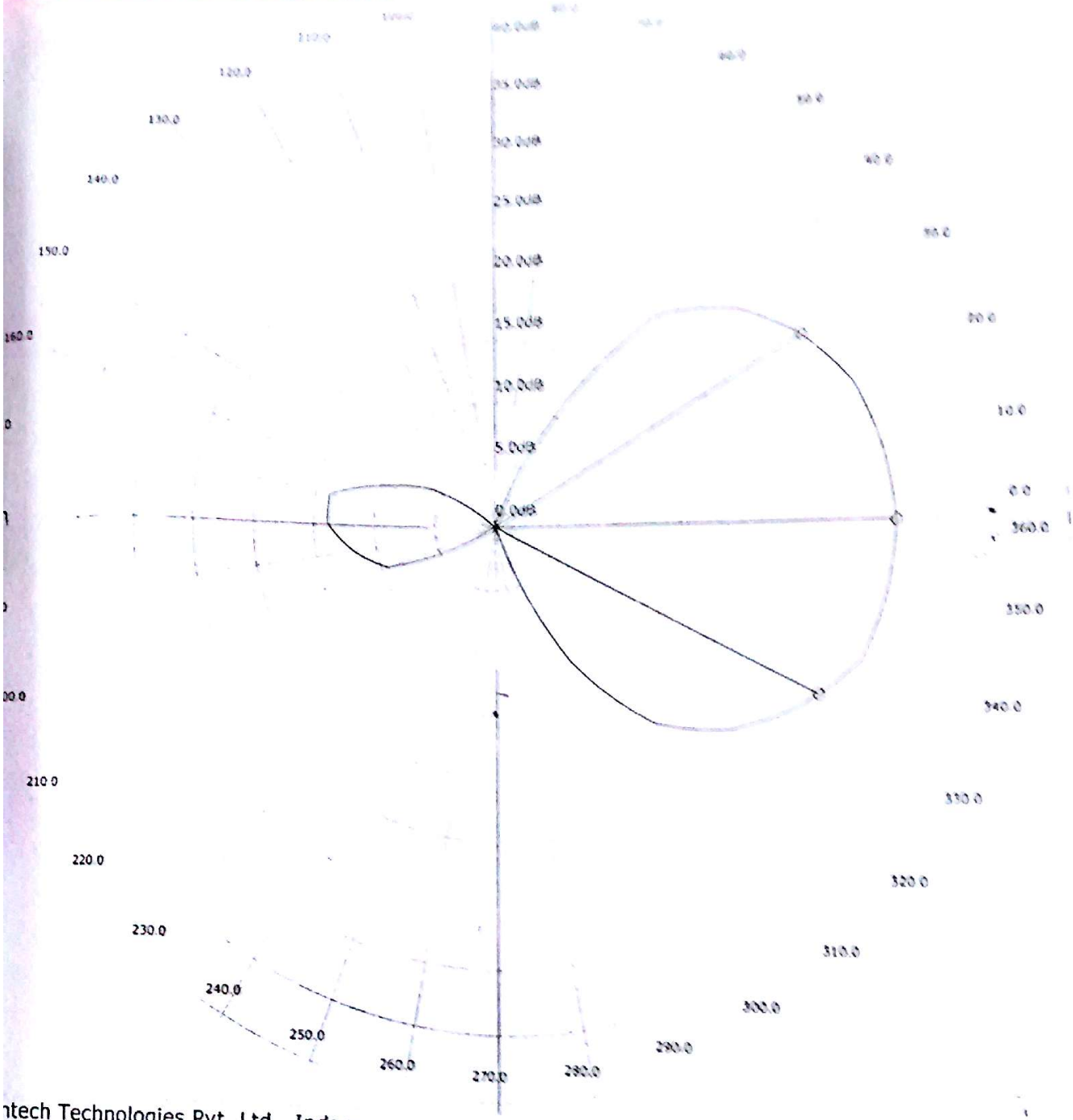
Comments :

Yagi UDA folded dipole 3 element

Beamwidth : 47; -3dB @ 338, 25 deg

FBR =

Directive gain = 26.2 dB



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ment Result :

th : 57;-3dB @ 333, 30 deg

Comments :

Yagi UDA folded dipole 5 element

Beamwidth: 57; -3dB @ 333, 30 deg

FBR = 24.5

Directive gain = 30.4 dB